AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Previously presented) A method of mixing a first stream of gas with a second stream of gas, comprising:

introducing a first stream of gas into a mixing chamber via a plurality of first stream passages flow coupled to the mixing chamber, wherein the first stream of gas is one of a stream of dilution air and a stream of exhaust gas from an engine;

directing a second stream of gas into the mixing chamber via at least one second stream passage flow coupled to a first end of the mixing chamber, the second stream of gas is the other of the stream of dilution air and the stream of exhaust gas from an engine;

forming a combined stream from the first and second streams; and

discharging the combined stream from the mixing chamber through a mixing chamber exit port,

the method further including at least one of the following characteristic factors:

1) directing the first and second streams of gas through the plurality of first stream passages and the second stream passages into the mixing chamber in a manner that the streams of gas are unobstructed by structure as they enter the mixing chamber;

2) providing walls of the mixing chamber with an absence of structure extending into the mixing chamber;

3) introducing the first and second streams of gas from the plurality of first stream passages and the second stream passage into the mixing chamber with a substantially well-developed flow; and

4) introducing at least one of the first and second streams of gas, as the exhaust gas, into the mixing chamber from more than one entrance port.

2. (Previously presented) The method of claim 1, further including:

expanding the combined stream downstream from the exit port.

3. (Original) The method of claim 1, further including:

introducing the second stream into a second stream manifold, and wherein directing the second stream includes directing the second stream from the second stream manifold via a plurality of second stream passages flow coupled to the mixing chamber.

4. (Original) The method of claim 1, wherein the first stream is directed into the mixing chamber at the first end of the mixing chamber.

5. (Previously presented) The method of claim 1, further including:

developing a substantially well-developed flow of the first stream within the plurality of first stream passages.

6. (Original) The method of claim 5, further including:

developing a substantially well-developed flow of the second stream within the at least one second stream passage.

7. (Canceled).

8. (Previously presented) The method of claim 1, further including:

sampling the combined stream for compliance with emission standards.

9. (Previously presented) An apparatus for mixing a first and a second stream of gas, comprising:

a first plurality of passages configured to direct the first stream of gas, wherein the first stream of gas is one of a stream of dilution air and a stream of exhaust gas from an engine; and

a mixing chamber having first and second ends, the mixing chamber being flow coupled to the first plurality of passages and configured to receive the second stream of gas at the first end, the mixing chamber having an exit port at the second end, the second stream of gas is the other of the stream of dilution air and the stream of exhaust gas from an engine,

the method further including at least one of the following characteristic factors:

1) wherein the first plurality of passages and the second stream passage attach to the mixing chamber in a manner that the first and second streams of gas are unobstructed by structure as they enter the mixing chamber;

2) wherein the mixing chamber has an absence of structure extending into the mixing chamber;

3) wherein the first plurality of passages and the second stream passage are configured to introduce the first and second streams of gas into the mixing chamber with a substantially well-developed flow; and

4) wherein at least one of the first plurality of passages and the second stream passage is configured to introduce at least one of the first and second streams of gas, as an exhaust gas, into the mixing chamber from more than one entrance port.

10. (Original) The apparatus of claim 9, further including:

a secondary mixing region flow coupled to the mixing chamber downstream of the exit port, wherein the secondary mixing region has one of a cross-section that gradually increases as the distance from the exit port increases and a cross-section that abruptly increases.

11. (Previously presented) The apparatus of claim 10, further including:

a second stream passage flow coupled to the mixing chamber at the first end and adapted to discharge the second stream of gas into the mixing chamber,

wherein the plurality of passages, the second stream passage, the mixing chamber, and the secondary mixing region have smooth walls, and

wherein at least the second stream passage, the mixing chamber, and the secondary mixing region are insulated.

12. (Original) The apparatus of claim 9, further including:

a secondary mixing region flow coupled to the mixing chamber downstream of the exit port; and

a reservoir box flow coupled to the secondary mixing region at an end opposite the end which is flow coupled to the exit port.

13. (Original) The apparatus of claim 9, wherein the mixing chamber has internal wall surfaces formed of electro-polished, passivated, stainless steel.

14. (Original) The apparatus of claim 9, wherein the mixing chamber has smooth internal walls and no projections extending inwardly from the internal walls.

15. (Original) The apparatus of claim 9, further including:

a second stream manifold flow coupled to the second stream of gas; and

a second plurality of passages flow coupled to and extending between the second stream manifold and the mixing chamber,

wherein the first and second plurality of passages do not substantially extend into the mixing chamber.

16. (Previously presented) The apparatus of claim 15, wherein the second stream manifold is an annular chamber.

17. (Original) The apparatus of claim 9, wherein the first plurality of passages are flow coupled to the mixing chamber at the first end of the mixing chamber.

18. (Canceled).

19. (Canceled).

20. (Canceled).

21. (Canceled).

22. (Previously presented) A mixing chamber for mixing a first stream of gas with a second stream of gas, comprising:

an internal volume defined by a first end, a second end, and walls extending between the first and second ends, the second end having a gradually converging portion, with an absence of structure extending from the first end, from the second end, and from the walls into the internal volume;

a first inlet opening configured to receive the first stream of gas into the mixing chamber, the first inlet opening located at the first end;

a plurality of second inlet openings configured to receive the second stream of gas into the mixing chamber, the plurality of second inlet openings symmetrically positioned with respect to the first inlet opening; and

an exit opening configured to discharge a combined stream of gas formed from the first and second streams of gas from the mixing chamber, the exit opening located downstream of the gradually converging portion wherein the first inlet opening and the plurality of second inlet openings are situated in a manner that the first and second streams of gas are unobstructed by structure extending into the mixing chamber.

23. (Original) The mixing chamber of claim 22, wherein the first stream of gas is a stream of exhaust gas from an engine and the second stream of gas is a stream of dilution air.

24. (Original) The mixing chamber of claim 22, wherein the first end, the second end, and the walls have internal surfaces formed of electro-polished, passivated, stainless steel.

25. (Previously presented) The mixing chamber of claim 22, wherein the first inlet opening and the plurality of second inlet openings are situated in a manner that the first and second streams of gas avoid impinging on each other as they enter the mixing chamber.

26. (Previously presented) The method of claim 1, wherein the characteristic factor of directing the first and second streams of gas through the plurality of first stream passages and the second stream passage into the mixing chamber in a manner that the streams of gas are unobstructed by structure as they enter the mixing chamber includes

directing the first and second streams of gas in a manner that they avoid impinging on each other as they enter the mixing chamber.

27. (Previously presented) The apparatus of claim 9, wherein the characteristic factor of the first plurality of passages and the second stream passage attach to the mixing chamber in a manner that the first and second streams of gas are unobstructed by structure as they enter the mixing chamber includes

the first plurality of passages and the second stream passage being configured in a manner that the first and second streams of gas avoid impinging on each other as they enter the mixing chamber.

28. (Previously presented) The method of claim 1, including more than one of the characteristic factors.

29. (Previously presented) The apparatus of claim 9, including more than one of the characteristic factors.

30. (Previously presented) A method of mixing a first stream of gas with a second stream of gas, comprising:

introducing a first stream of gas into a mixing chamber via a plurality of first stream passages flow coupled to the mixing chamber;

directing a second stream of gas into the mixing chamber via at least one second stream passage flow coupled to a first end of the mixing chamber;

forming a combined stream from the first and second streams;

discharging the combined stream from the mixing chamber through a mixing chamber exit port;

providing walls of the mixing chamber with an absence of structure extending into the chamber; and

introducing at least one of the first and second streams of gas into the mixing chamber as an entire exhaust gas flow.

31. (Canceled).

32. (Previously presented) A method of mixing an exhaust gas with a dilution gas for an emissions sampling system, comprising:

directing the flow of an exhaust gas from an engine through an exhaust gas passage;

directing the flow of a dilution gas through a dilution gas passage;

receiving the dilution gas from the dilution gas passage at one end of a mixing chamber, the mixing chamber being flow coupled to the dilution gas passage;

receiving the exhaust gas into the mixing chamber from the exhaust gas passage;

developing a substantially well-developed flow stream of the dilution gas upstream of the exhaust gas passage;

sampling the combined stream for compliance with emission standards; and

discharging a combined stream of the exhaust gas and the dilution gas from the mixing chamber.

33. (Previously presented) The method of claim 32, wherein the mixing chamber includes an absence of structure extending into the mixing chamber.

34. (Previously presented) An emissions sampling system for mixing an exhaust gas with a dilution gas, comprising:

an exhaust gas passage configured to direct a flow of the exhaust gas from an engine;

a dilution gas passage configured to direct a flow of the dilution gas;

a mixing chamber flow coupled to the dilution gas passage and configured to receive the dilution gas from the dilution gas passage at one end, the mixing chamber also being configured to receive the exhaust gas from the exhaust gas passage; and

a sampling device in the mixing chamber to sample the gas in the mixing chamber,

wherein the dilution gas passage is configured to create a substantially well-developed flow stream of the dilution gas upstream of the exhaust gas passage,

wherein the mixing chamber includes an end configured to discharge a combined stream of the exhaust gas and the dilution gas from the mixing chamber.

35. (Previously presented) The emissions sampling system of claim 34, wherein the mixing chamber includes an absence of structure extending into the mixing chamber.